WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI C1) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-110385-1U

VOLUME I

OPERATOR'S MANUAL

626-PA-6002A

DC MONITOR

NOTE: Refer to Volume 2 (Service Manual) of TM-110385-1U for maintenance data.

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DRANETZ

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NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

VOLUME 1
OPERATOR'S MANUAL

626-PA-6002A DC MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, consists of three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. In addition, Appendices A and B cover Options 101 and 102, respectively, for the 6002A plug-in. Volume 2, the Service manual, contains the maintenance instructions (sections IV thru VII).

1.2 INTRODUCTION

This manual provides operating instructions for the 626-PA-6002A DC Monitor Plug-in, herinafter referred to as the 6002A. The 6002A is designed for installation in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information described in Volume 1 of the Series 626 mainframe manual.

1.3 PURPOSE

The 6002A monitors disturbances on DC power buses. This single channel unit has an overall range of 0.5 to to 80 VDC, programmable in three ranges. With thresholds programmed by the user, the 6002A stores, analyzes, classifies and prints out quantitative and qualitative disturbance data. Accompanying the data is a printout of the time derived from a highly accurate crystal-controlled 24-hour clock in the mainframe.

The 6002A monitors two types of disturbances: DC power bus transients and waveform disturbances. Power bus transients are divided into five display categories: overvoltage, undervoltage, voltage change, voltage surge and voltage sag. Waveform disturbances, identified as "impulses" include all conditions that cause the power bus waveform to deviate from an ideal (flat) waveform. The threshold value of each type of disturbance, above which detection and printout occurs, is operator programmable. Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when disturbances occur. In an alternate mode, a disturbance data summary printout occurs only at the end of each day. This feature permits long term unattended operation.

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The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in hard memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

1.4 EQUIPMENT CHARACTERISTICS

The 6002A is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any of the five slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6002A are listed in Table 1-1.

Table 1-1. 626-PA-6002A Specifications

Input	2-wire differential Z_{in} = 10 meg plus 500 pf (each side to ground)
Overall Voltage Ranges	0.5 to 20V 1.0 to 40V 2.0 to 80V
User set voltage lower spec limit (0.1V increments)	
20V Range	0.5 to 19.9V
40V Range	1.0 to 39.8V
80V Range	2.0 to 79.6V
User set voltage upper spec limit (0.1V increments)	
20V Range	0.6 to 20.0V
40V Range	1.2 to 40.0V
80V Range	2.4 to 80.0V
Voltage Change Sensitivity (0.1V increments)	
20V Range	0.1 to 5.0V
40V Range	0.2 to 10V
80V Range	0.4 to 20V
Voltage Measurement Accuracy	±1% of reading ±0.5% of F.S.

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Table 1-1. 626-PA-6002A Specifications (cont'd.)

Voltage Measurement Resolution	
20V Range	0.04V
40V Range	0.08V
80V Range	0.16V
Impulse Ranges (2 mSec to 1 uSec)	
20V Range	0.5 to 20V
40V Range	1.0 to 40V
80V Range	2.0 to 80V
Impulse Thresholds (0.1 volt increments)	
20V Range	0.5 to 20V
40V Range	1.0 to 40V
80V Range	2.0 to 80V
Impulse Accuracy	±5% of reading ±1% F.S. for half-sinewave impulses 10 uSeconds in duration regardless of polarity or grounding. Error increases to ±10% of reading, ±1% F.S. at 5 uSec and 50 uSec pulse durations, and is typically -6 dB at 2 mSEc and 1 uSec pulse durations.

1.5 STANDARD ACCESSORIES

Model No.	Part No.	Quantity	Description
626PA6002A1 Barrier Block Version	TM-110385-1U (Vol. 1)	1	Operator's Manual
626PA6002A2 Connector Version	TM-110385-1U (Vol. 1)	1	Operator's Manual
	110475	1	D.C. Cable

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1.6 OPTIONAL ACCESSORIES

Part No.	Quantity	Description
TM-110385-1U (Vol. 2)	1	Service (Maintenance) Manual

1.7 FACTORY REPAIR

When factory repair is desired, proceed as follows:

1. Contact the Dranetz Service Corporation (formerly Dranetz Technologies, Inc., Customer Service Department) in order to obtain an Authorization Number for factory repair.

Telephone: (201) 755-7081

TWX: (710) 997-9553

Telex: 499-7808

Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Service Corporation.

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SECTION II
INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 6002A in the mainframe, proceed as follows:

CAUTION: Be sure 626 is turned off and that all power connected to all plug-in modules is turned off.

a. Position the top and bottom front corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 LOAD RATINGS

The Series 626 standard mainframe has an upper limit of the total load rating of the installed modules. The overall mainframe capacity is set at 20 units, and individual modules have load ratings as follows:

Plug-In	Load Rating
626-PA-6001	2 Units
626-PA-6001 With Extra Option Board	3 Units
626-PA-6002	2 Units
626-PA-6003	4 Units
626-PA-6005	2 Units
626-PA-6006	2 Units
626-PA-6007	1 Unit
626-PA-6008	2 Units
626-PA-6009	4 Units
626-PA-6011	1 Unit
626-PA-6012	2 Units
626-PA-6012A	3 Units
626-PA-6013	2 Units
626-PA-6014	1 Unit
626-PA-6015	4 Units
626-PA-6018	4 Units
626-PA-6020	4 Units

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NOTE

When selecting modules for installation in any mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20.

2.2 CONNECTING DC POWER SOURCE TO MODULE

2.2.1 Connection Procedure

The 6002A is supplied with a barrier type terminal strip under a small cover (626-PA-6002A-1) or with a 3 pin connector (626-PA-6002A-2) located at the rear of the module. Proceed as follows:

a. Insert key in FUNCTION key switch on front panel of mainframe and set switch to OFF position.

b. Turn off DC power source that is to be monitored by the module.

c. Remove the terminal strip safety cover to expose the connections. Now connect the DC line to the three power terminals (positive DC to the (+); negative to the (-), and earth ground to the third terminal, as marked). When all connections have been made, be sure to replace the terminal block cover, then reapply DC power.

d. If a 3 pin connector is installed on the rear panel of the 6002A, the DC source to be monitored should be wired to the cable assembly (DTI P/N 110475) supplied with the module. If the supplied cable is not adequate, the mating 3-pin connector can be obtained from AMP, Inc. The part numbers are as follows:

Part Number	Description
1-480700-0	Connector Housing
1-640720-0	Strain Relief
350690-1	Pin Contacts

Attach mating connector to rear panel connector then reapply DC power.

CAUTION

To avoid damaging the equipment, do not apply DC voltages in excess of 100V peak to the 6002A.

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2.2.2 Circuit Applications

WARNING

Connection should only be performed by qualified personnel. Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, minimum flexible cord size is No. 18 (1 mm^2). For branch circuits with higher ampacity, refer to National Electric Code (ANSI CI-1975 Para. 240-4 and Para. 250-95). Special consideration of ground may be required. Refer to Article 250 of above reference if in doubt. Outside U.S.A. consult applicable safety standards.

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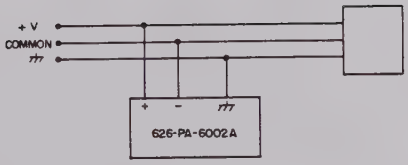
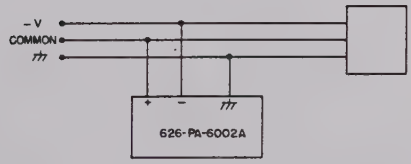


Connection to Positive DC Sources



Connection to Negative DC Sources

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2.2.3 Installation Guidelines

Proper monitoring and analysis of AC and DC voltage disturbances requires careful attention to the method of connection between the Series 626 Universal Disturbance Analyzer and the monitored circuit. To obtain the most accurate and relevant voltage monitoring data, the following suggested guidlines should be utilized.

1. To minimize spurious impulse transients and interchannel coupling, always use the Dranetz test cables supplied with the 626. If cables are not supplied, such as with the barrier strip input modules, the test cable should be composed of twisted-pair wires for each input channel.

2. Test cable length should be minimized, preferably less than 8 feet from the Series 626 to the circuit connection point. This will minimize amplitude variation of impulse transients.

3. If monitoring a power line connected to critical, sensitive load equipment, the test cable should be connected to the power line as close as possible to the load. For three-phase loads, the 626 should be connected in the same way as the load equipment, i.e. Phase to Phase or Phase to Neutral.

4. Use of instrument-grade potential transformers for monitoring impulses on high voltage power lines is not recommended. The limited frequency response of most potential transformers may result in substantial variation of impulse amplitude.

5. The Series 626 is designed to operate from disturbed power lines. Therefore, the 626 power supply may be connected to the same power line that is being monitored. However, the user should be aware that the extensive transient suppression incorporated with the 626 power supply may alter the transient characteristics of the AC power line to which the power supply is connected. If the user wishes to prevent alteration of the transient characteristics of the power line being monitored, the 626 power supply input should be separated from the monitored inputs.

6. The ground terminals of the plug-in modules are connected internally to the safety grounding conductor in the 626 power plug. Be careful not to inadvertently contaminate a "clean" ground with a "dirty" ground.

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2.3 OPERATING THE 6002A

2.3.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with 6002A operation are described in Table 2-1. Figure 2-1 shows the Series 626 controls used by the 6002A plug-in. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Series 626 Mainframe manual.

Table 2-1. 6002A Operating Controls

Item	Function
RANGE key and indicator	When indicator lights, user is cued to depress RANGE key and enter the desired full scale voltage range (20, 40, or 80) via the numeric keyboard.
LO LIMIT key	When depressed, enables numeric keyboard to program low limit voltage.
HIGH LIMIT key	When depressed, enables numeric keyboard to program high limit voltage.
SENS key	When depressed, enables numeric keyboard to program voltage sensitivity value.
IMP SENS key	When depressed, transfers numeric keyboard to program impulse voltage sensitivity value.
ENTER key	When depressed, transfers numeric keyboard value into the 6002A memory.
DATA pushbutton	When depressed, produces data summary printout.
PRESET pushbutton	With FUNCTION switch set to program and a channel switch (1-5) depressed, depressing PRESET switch recalls non-volatile factory program for that channel.

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Figure 2-1. Series 626 Controls Used by the 6001A Plug-In

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2.3.2 Programming Procedure

Assume it is desired to program a full scale range of 20V, a high limit of 15V, a low limit of 10V, voltage sensitivity of 0.5 volts, and an impulse sensitivity of 2V. Voltage sensitivity sets the deviation from the present voltage value above or below which a detected value produces a recorded disturbance. For impulse measurements, the sensitivity corresponds to the absolute threshold, so that for an impulse sensitivity of 2 volts, a disturbance is recorded when impulse amplitude is greater than or equal to 2 volts.

For the example cited, program the 6002A as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that the red indicator next to the RANGE pushbutton lights. Depress the RANGE key.

d. Note that two yellow indicators above the numeric keyboard now light. Enter 20, using the keyboard. This selects the first full scale range (0.5 to 20.0V) of the plug-in. As each digit is entered, one indicator goes out. If an error is made, depress CLEAR ENTRY and correct the entry.

e. When the full scale value has been programmed, the green indicator next to the ENTER key lights. Depress this key to enter the value. The full scale entry (RANGE F.S. 20.0V) will now be echoed back on the printout.

f. When the ENTER indicator goes out, one red indicator above the center bank of pushbuttons lights. This indicates that another function may be programmed.

g. Depress the HI LIMIT key. Program the high limit value (15) as in step d.

h. When the green ENTER indicator lights, depress the ENTER key. The programmed high limit value will be echoed back on the printout.

i. Repeat steps f, g, and h for the low limit value (10) using the LO LIMIT key.

j. Repeat steps f, g, and h for the voltage sensitivity, using the SENS key and programming the voltage value as 0.5.

k. Repeat steps f, g, and h for the impulse sensitivity (02 volts), using the IMP SENS key. The completed program printout should take the following form:

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626*

IMPULSE SENS Ø2.0V
VOLTAGE SENS Ø0.5V
V LOW LIMIT 10.0V
V HIGH LIMIT 15.0V
RANGE F. S. 20.0V

626A*

RANGE F.S. 20.0V
V HIGH LIMIT 15.0V
V LOW LIMIT 10.0V
VOLTAGE SENS Ø0.5V
IMPULSE SENS Ø2.0V

NOTE: The instrument is designed to detect an invalid entry and to automatically shift high and low limits if range is changed without reprogramming the limits. For example, if the full scale value is selected as 20V and the user selects 22V as the low limit value, the printout ENTRY TOO HIGH will appear.

1. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program in effect may be obtained by simply depressing the PROG pushbutton.

2.4 SELECTING THE FACTORY PRESET PROGRAM

To select the program stored in hard memory, set the FUNCTION switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET pushbutton to recall the factory-set program. An example of this sequence appears below.

626

(Factory Program)

IMPULSE SENS Ø2.0V
VOLTAGE SENS Ø0.3V
V LOW LIMIT 11.0
V HIGH LIMIT 14.0V
RANGE F.S. 20.0V
626-PA-6002A
CH 1
PROGRAM SUMMARY

(Press Reset)

IMPULSE SENS Ø2.0V
VOLTAGE SENS Ø0.5V

(Operator Program)

V LOW LIMIT 10.0V
V HIGH LIMIT 15.0V
RANGE F.S. 20.0V
626-PA-6002A
CH1
PROGRAM SUMMARY
PROGRAM MODE

626A

PROGRAM MODE
PROGRAM SUMMARY
CH1
626-PA-6002A
RANGE F.S. 20.0V
V HIGH LIMIT 15.0V
V LOW LIMIT 10.0V

(Operator Program)

VOLTAGE SENS Ø0.5V
IMPULSE SENS Ø2.0V

(Press Reset)

PROGRAM SUMMARY
CH 1
626-PA-6002A
RANGE F.S. 20.0V
V HIGH LIMIT 14.0V
V LOW LIMIT 11.0V
VOLTAGE SENS Ø0.3V
IMPULSE SENS Ø2.0V

(Factory Program)

---

*If you are using a Model 626, read (from the bottom up) the "626" printouts in this manual; if using a 626A, read (from the top down) the "626A" printouts instead.

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2.5 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6002A, it is recorded and displayed in characteristic manner.

2.5.1 Overvoltage

An overvoltage condition exists when the monitored DC bus voltage exceeds the user specified upper limit for more than 2.55 seconds. The beginning of an overvoltage condition is indicated by a printout such as the following:

```
4    HIGH    12:34:56.78
```

where 4 is the channel number and time is given in hours, minutes and seconds (to .01 sec resolution).

When the DC voltage recovers to normal, a printout such as the following occurs:

626				626A			
↑	4	NORM	12:36:14.56		16.5	V	MAX
		16.5	V MAX		4	NORM	12:36:14.56 ↓

indicating when normal voltage was restored and the value of the highest voltage reached during the overvoltage interval.

2.5.2 Undervoltage

An undervoltage condition exists when the monitored power line voltage remains below the user-specified lower limit for more than 2.55 seconds. The beginning of an undervoltage condition is indicated by a printout such as the following:

```
4    LOW    10:09:12.34
```

When the line voltage returns to normal level, a message such as the following is printed:

626				626A			
↑	4	NORM	10:09:23.45		10.4	V	MIN
		10.4	V MIN		4	NORM	10:09:23.45 ↓

indicating when normal voltage was restored and the value of the lowest voltage reached during the undervoltage interval.

2.5.3 Voltage Change

A voltage change printout is triggered when the line voltage changes more than a preselected amount from the last printed value. The voltage change sensitivity is a user-selected voltage that varies with the full scale range selected. For the 20V range, a sensitivity of 0.1 to 5.0V may be selected. The following example shows several voltage change printouts:

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626	626A	Remarks
2 INC 01:02:34.56 12.4V	12.4V 2 INC 01:02:34.56	Voltage increased to 12.4 V at time shown
2 DEC 01:02:34.56 11.3V	11.3V 2 DEC 01:02:34.56	Voltage decreased to 11.3 V at time shown

2.5.4 Voltage Surge

A Voltage Surge is defined as a DC voltage which increases through a user-selected upper limit and then returns to an in-tolerance condition in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:

```
3    HIGH    12:34:50.49
```

When the DC voltage returns to a normal level following a Surge condition, a message such as the following will be printed:

626	626A
3 NORM 12:34:51.59 15.1 V MAX SURGE 1.10 SEC	SURGE 1.10 SEC 15.1 V MAX 3 NORM 12:34:51.59

In this case, the time at which the voltage returned to normal is shown as well as the maximum voltage reached and the surge duration.

2.5.5 Voltage Sag

A Voltage Sag is defined as a line voltage that decreases below the user-selected lower limit and then returns to an in-tolerance condition in less than 2.56 seconds. Sag printouts take the same form as surge printouts, with the term SAG replacing the term SURGE, and the term MIN replacing the term MAX.

2.5.6 Impulses

"Impulse" disturbances represent any line perturbation which contains frequency components in the 300 Hz to 500 kHz range. An impulse type disturbance produces a printout such as the following:

626	626A
2 IMP 10:12:13.45 +20 V PK	+20 V PK 2 IMP 10:12:13.45

This printout indicates that an impulse which deviated from normal DC voltage by +20 volts peak was detected on Channel 2 at the time shown.

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2.6 PRINTOUT MODES

The setting of the PRINTOUT MODE switch on the front panel of the mainframe determines how much detail is printed out. Printout data is reduced as the switch is rotated counterclockwise.

The following example printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in Channel 1 and that the limits for Channel 1 were programmed as follows:

RANGE F.S.	80V	V HIGH LIMIT	70V
V LOW LIMIT	50V	V SENSITIVITY	2V

The example printouts are referenced to figures 2-2 and 2-3 which illustrate overvoltage and voltage sag disturbances, respectively.

Disturbances which occur with the PRINTOUT MODE switch in the SUMMARY ONLY position do not generate individual printouts but are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA button.

The printout generated first (on the next page) is an example of overvoltage (fig. 2-2) in the NORMAL mode. The second group shows overvoltage in the OUT-OF-LIMITS ONLY mode.

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626

1 NORM 12:56:38.51
84.1 V MAX

1 HIGH 12:56:34.21

1 NORM 12:56:38.51
84.1 V MAX

1 DEC 12:56.38.50
75.2 V

1 INC 12:56:35.78
82.3 V

1 INC 12:56:35.62
80.3 V

1 INC 12:56:35.40
78.3 V

1 INC 12:56:34.22
76.3 V

1 INC 12:56:34.21
74.2 V

1 HIGH 12:56:34.21

626A

1 HIGH 12:56:34.21

74.2 V
1 INC 12:56:34.21

76.3 V
1 INC 12:56:34.22

78.3 V
1 INC 12:56:35.40

80.3 V
1 INC 12:56:35.62

82.3 V
1 INC 12:56:35.78

75.2V
1 DEC 12:56:38.50

84.1 V MAX
1 NORM 12:56:38.51

1 HIGH 12:56:34.21

84.1 V MAX
1 NORM 12:56:38.51

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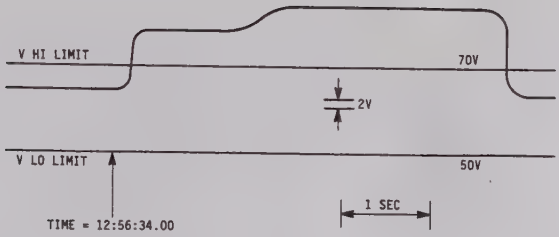

Figure 2-2. Overvoltage Disturbance (6002A)

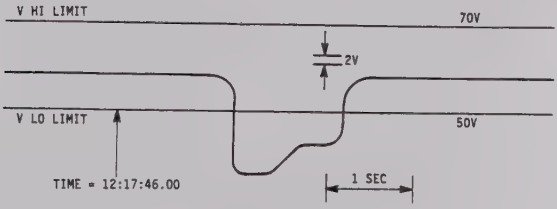

Figure 2-3. Voltage Sag Disturbance (6002A)

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The following printout illustrates overvoltage (fig. 2-2) in the MAXIMUM DETAIL mode.

626

```
1  DEC  12:56:38.61
   64.8 V

1  DEC  12:56:38.53
   66.8  V

1  DEC  12:56:38.51
   69.0  V

1  NORM 12:56:38.51
   84.1  V  MAX

1  DEC  12:56:38.50
   75.2 V

1  INC  12:56:35.78
   82.3 V

1  INC  12:56:35.62
   80.3 V

1  INC  12:56:35.40
   78.3 V

1  INC  12:56:34.22
   76.3 V

1  INC  12:56:34.21
   74.2 V

1  HIGH  12:56:34.21

1  INC  12:56:34.20
   66.1 V

1  INC  12:50:12.34
   64.0 V
```

626A

```
   64.0 V
1  INC   12:50:12.34

   66.1 V
1  INC   12:56:34.20

1  HIGH   12:56:34.21

   74.2 V
1  INC   12:56:34.21

   76.3 V
1  INC  12:56:34.22

   78.3 V
1  INC  12:56:35.40

   80.3 V
1  INC  12:56:35.62

   82.3 V
1  INC  12:56:35.78

   75.2 V
1  DEC  12:56:38.50

   84.1  V  MAX
1  NORM 12:56:38.51

   69.0  V
1  DEC  12:56:38.51

   66.8  V
1  DEC   12:56:38.53

   64.8 V
1  DEC   12:56:38.61
```

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The first group generated in the printouts below illustrates voltage sag (fig. 2-3) in the NORMAL mode; the second (3-line) group illustrates voltage sag in the OUT-OF-LIMITS mode.

626

```
1  NORM  12:17:48.61
   035.1  V  MIN
   SAG 1.25  SEC

1  LOW   12:17:48.51

1  NORM  12:17:48.61
   035.1  V  MIN
   SAG  1.25 SEC
1  INC  12:17:48.60
   48.1  V
1  INC  12:17:48.55
   043.0  V
1  INC  12:17:48.05
   041.0  V
1  INC  12:17:47.96
   039.0 V
1  DEC  12:17:47.39
   036.9 V
1  DEC 12:17:47.37
   039.1 V
1  DEC  12:17:47.36
   46.3 V
1  LOW  12:17:47.36
```

626A

```
1  LOW  12:17:47.36
   046.3  V
1  DEC   12:17:47.36
   039.1  V
1  DEC  12:17:47.37
   036.9  V
1  DEC  12:17:47.39
   039.0  V
1  INC  12:17:47.96
   041.0  V
1  INC  12:17:48.05
   043.0  V
1  INC  12:17:48.55
   48.1   V
1  INC  12:17:48.60
   SAG   1.25 SEC
   035.1  V  MIN
1  NORM  12:17:48.61

1  LOW  12:17:48.51

   SAG  1.25  SEC
   035.1  V  MIN
1  NORM   12:17:48.61
```


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The following is an example of printout of voltage sag (fig. 2-3) in the MAXIMUM DATAIL mode.

626	626A
1 INC 12:17:48.86 57.1 V	58.0 V 1 INC 12:16:32.15
1 INC 12:17:48.69 55.1 V	55.8 V 1 DEC 12:17:47.35
1 INC 12:17:48.62 53.1 V	1 LOW 12:17:47.36
1 INC 12:17:48.61 50.9 V	46.3 V 1 DEC 12:17:47.36
1 NORM 12:17:48.61 035.1 V MIN SAG 1.25 SEC	039.1 V 1 DEC 12:17:47.37
1 INC 12:17:48.60 48.1 V	036.9 V 1 DEC 12:17:47.39
	039.0 V 1 INC 12:17:47.96
1 INC 12:17:48.55 043.0 V	041.0 V 1 INC 12:17:48.05
1 INC 12:17:48.05 041.0 V	043.0 V 1 INC 12:17:48.55
1 INC 12:17:47.96 039.0 V	48.1 V 1 INC 12:17:48.50
1 DEC 12:17:47.39 036.9 V	SAG 1.25 SEC 035.1 V MIN 1 NORM 12:17:48.61
1 DEC 12:17:47.37 039.1 V	50.9 V 1 INC 12:17:48.61
1 DEC 12:17:47.36 46.3 V	53.1 V 1 INC 12:17:48.62
1 LOW 12:17:47.36	55.1 V
1 DEC 12:17:47.35 55.8 V	1 INC 12:17:48.69 57.1 V
1 INC 12:16:32.15 58.0 V	1 INC 12:17:48.86

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SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6002A plug-in is operating properly.

3.2 SYSTEM CHECK

When the PRINTOUT MODE switch is set to SYSTEM CHECK, a source of precise signals is applied to the front end circuitry of the 6002A. Any inputs that are connected at this time will be automatically dsconnected for the system check period. These signals fully verify the operational integrity of the module. A typical system check printout, as well as the system check signals and the allowable tolerance levels are shown below.

626

```
**********
PRESENT V  05.06 V
IMP   + 10.20 V PK
   626-PA-6002AR2
        CH 1

00/00/00  01:21:10
***SYSTEM CHECK***
```

626A

```
***SYSTEM CHECK***
00/00/00  01.21:10

        CH 1
   626-PA-6002AR2
IMP   + 10.20 V PK
PRESENT V  05.06 V
**********
```

3.3 SYSTEM CHECK SIGNALS

Impulse: +10.00V pk

Voltage: 5.00V DC

3.4 SYSTEM CHECK TOLERANCES

F.S. Range	Impulse	Voltage
20V	8.8 to 11.2 Vpk	4.85 to 5.15 V
40V	8.6 to 11.4 Vpk	4.75 to 5.25 V
80V	8.2 to 11.8 Vpk	4.55 to 5.45 V

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APPENDIX A. IMPULSE DURATION OPTION 101 FOR 626-PA-6002A PLUG-IN (NOT COMPATIBLE WITH OPTION 102)

A.1 INTRODUCTION

The following paragraphs describe the differences between the 6002A with Option 101 and the standard 6002A.

NOTE

The following data supersedes that found in previous paragraphs of this manual unless otherwise stated.

A.2 PURPOSE

Option 101 is designed to provide information on impulse duration. It has no effect on the measurements made by the standard 6002A as described in previous paragraphs.

A.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 101 are listed in Table A-1. All specifications for the 6002A, listed in Table 1-1, still apply.

Table A-1. 626-PA-6002A Option 101 Technical Specifications

IMPULSE DURATION

Range: 1 uSec to 1023 uSec

Accuracy: ±6% of reading ±0.3% F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 2.00 Vpk. * Typically - 10% at 200 uSec, -20% at 400 uSec, -50% at 1000 uSec.

* 2.00 Vpk on 20 V F.S. Range
4.00 Vpk on 40 V F.S. Range
8.00 Vpk on 80 V F.S. Range

Timing Reference Points: Start at 0.5V** - stop at 30% of Vpk.

** 0.5 Vpk on 20 V dc Range
1.0 Vpk on 40 V dc Range
2.0 Vpk on 80 V dc Range

Minimum Impulse Voltages: 1.00 Vpk on 20.0 V dc Range
2.00 Vpk on 40.0 V dc Range
4.00 Vpk on 80.0 V dc Range

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A.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6002A (par. 2.1).

A.5 CONNECTIONS TO THE MODULE

Connecting the 6002A to the line to be monitored is the same as described in paragraph 2.2.

A.6 OPERATING THE 6002A WITH OPTION 101

Operation of the 6002A with Option 101 requires no additional programming steps. It is the same as described in paragraph 2.3.2.

A.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 101 are those for module identification and impulse data.

PROGRAM SUMMARY

When the Program Summary key (designated "PROG") is depressed, the module will be identified as a 626-PA-6002AR1 as in the following example.

626	626A
IMPULSE SENS 02.0V	PROGRAM SUMMARY
VOLTAGE SENS 00.5V	11/17/83 14:10:53
V LOW LIMIT 10.0V	CH1
V HIGH LIMIT 15.0V	626-PA-6002AR1
RANGE F.S. 20.0V	RANGE F.S. 20.0V
626-PA-6002AR1	V HIGH LIMIT 15.0V
CH1	V LOW LIMIT 10.0V
11/17/83 14:10:53	VOLTAGE SENS 00.5V
PROGRAM SUMMARY	IMPULSE SENS 02.0V

IMPULSE

When used with the 20.0V FS range, a minimum impulse voltage of 1.00 Vpk is required to obtain duration data. This minimum voltage level increases with range, as shown in Table A-1. The impulse printout will take the following form:

626	626A
4 IMP 12:34:56.88	+ 03.64V PK, 089 uS
+ 03.64V PK, 089uS	4 IMP 12:34:56.88

This printout indicates that an impulse which deviated from the normal bus voltage for 89 microseconds with a peak voltage of 3.64 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the "-" terminal on the 6002A rear panel.

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Figure A-1 illustrates an impulse duration measurement.

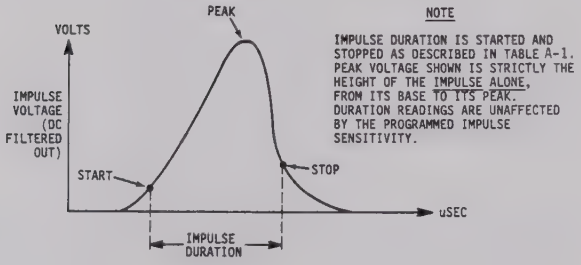
PEAK
VOLTS
IMPULSE VOLTAGE (DC FILTERED OUT)
START
STOP
uSEC
IMPULSE DURATION
NOTE
IMPULSE DURATION IS STARTED AND STOPPED AS DESCRIBED IN TABLE A-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. DURATION READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure A-1. Impulse Duration Measurement

A.8 Printout Modes

Printout modes and calibration signals remain the same as in the standard 6002A described in paragraph 2.6.

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APPENDIX B. IMPULSE STRENGTH OPTION, OPTION 102 FOR 626-PA-6002A PLUG-IN (NOT COMPATIBLE WITH OPTION 101)

B.1 INTRODUCTION

The following paragraphs describe the differences between the 6002A with Option 102 and the standard 6002A.

NOTE

The following data supersedes that found in Sections I thru III unless otherwise stated.

B.2 PURPOSE

Option 102 is designed to provide information on impulse strength (volt-second) area; it has no effect on the measurements made by the standard 6002A.

B.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 102 are listed in Table B-1. All specifications for the 6002A, listed in Table 1-1, still apply.

Table B-1. 626-PA-6002A Option 102 Technical Specifications

IMPULSE STRENGTH

Ranges: 20.0V F.S. Range 0.000004 to 0.004092 V-Sec
40.0V F.S. Range 0.000008 to 0.008184 V-Sec
80.0V F.S. Range 0.000016 to 0.016368 V-Sec

Accuracy: ±10% of reading, ±0.1% of F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 2.00 Vpk*. Typically -20% at 200 uSec, -50% at 500 uSec.

* 2.00 Vpk on 20.0V F.S. Range
4.00 Vpk on 40.0V F.S. Range
8.00 Vpk on 80.0V F.S. Range

Timing Reference Points: Start at 0.5V** - stop at 30% of Vpk.

** 0.5 Vpk on 20 V dc Range
1.0 Vpk on 40 V dc Range
2.0 Vpk on 80 V dc Range

Minimum Impulse Voltages: 1.00 Vpk on 20.0 Vdc Range
2.00 Vpk on 40.0 Vdc Range
4.00 Vpk on 80.0 Vdc Range

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B.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6002A (par. 2.1).

B.5 CONNECTIONS TO THE MODULE

Connecting the 6002A with Option 102 to the line to be monitored is the same as the standard 6002A (par. 2.2.1).

B.6 OPERATING THE 6002A WITH OPTION 102

Operation of the 6002A with Option 102 requires no additional progamming steps. Programming is the same as described in paragraph 2.3.2.

B.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 102 are those for module identification and impulse data.

PROGRAM SUMMARY

When the Program Summary key (designated "PROG") is depressed, the module will be identified as a 626-PA-6002AR2 as in the following example.

626

```
IMPULSE SENS      01.0V
VOLTAGE SENS      00.5V
V LOW LIMIT       10.0V
V HIGH LIMIT      15.0V
RANGE F.S.        20.0V
  626-PA-6002AR2
      CH1
11/17/83   14:27:39
PROGRAM SUMMARY
```

626A

```
PROGRAM SUMMARY
11/17/83   14:27:39
      CH1
  626-PA-6002AR2
RANGE F.S.        20.0V
V HIGH LIMIT      15.0V
V HIGH LIMIT      10.0V
VOLTAGE SENS      00.5V
IMPULSE SENS      01.0V
```

IMPULSE

When used with the 20.0V FS range, a minimum impulse voltage of 1.00 Vpk is required to obtain strength data. This minimum voltage level increases with range as shown in Table B-1.

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The impulse printout will have the following form:

626	626A
↑ 4 IMP 12:34:56.88	+02.58V PK
0.000156 V-SEC	0.000156 V-SEC ↓
+02.58V PK	4 IMP 12:34:56.88

This printout indicates that an impulse which deviated from the normal bus voltage with a strength of 0.000156 V-Sec and a peak voltage of 2.58 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the "-" terminal on the 6002A rear panel.

Figure B-1 illustrates an impulse strength measurement.

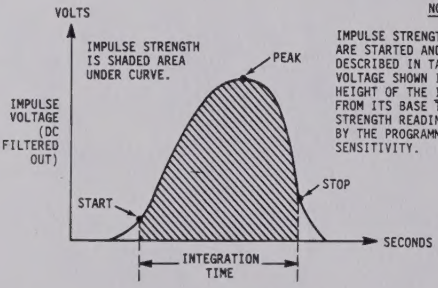
VOLTS
IMPULSE STRENGTH IS SHADED AREA UNDER CURVE.
PEAK
IMPULSE VOLTAGE (DC FILTERED OUT)
START
STOP
SECONDS
INTEGRATION TIME
NOTE
IMPULSE STRENGTH MEASUREMENTS ARE STARTED AND STOPPED AS DESCRIBED IN TABLE B-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. STRENGTH READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure B-1. Impulse Strength Measurement

B.8 PRINTOUT MODES

Printout modes and calibration signals remain the same as in the standard 6002A described in paragraph 2.6.

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